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10/656,586	09/04/2003	Yu-Lien Huang	67,200-1133	7926

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EXAMINER
LUND, JEFFRIE ROBERT

ART UNIT	PAPER NUMBER
1792	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/656,586	Applicant(s) HUANG ET AL.	
	Examiner Jeffrie R. Lund	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11/13/07.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5 and 21-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5 and 21-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 2, 21-28, and 31-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al, US Patent Application Publication 2002/0000197, in view of Ohta, US Patent 4,526,132.

Masuda et al teaches a processing apparatus 1 that includes a process chamber 16 having a vertical chamber wall defining a chamber interior 14, a showerhead 12 having a lateral surface engaging the chamber wall provided in the process chamber. (Figures)

Masuda et al differs from the present invention in that Masuda et al does not

Art Unit: 1792

teach the showerhead is held by a plurality of lateral fasteners with a fastener head and threaded shank, the fasteners structurally isolated from the chamber interior.

Ohta teaches supporting a gas source 37 with a plurality of lateral screws 52, structurally isolated from the chamber. The fasteners are physically separated from the chamber interior and the separation inherently prevents particle contamination of the chamber interior by thermal cycling of the fasteners. (Figure 3)

The motivation for attaching the showerhead of Masuda et al with the lateral screws of Ohta, through the chamber wall into the showerhead, is to provide a means of mounting the showerhead of Masuda et al as required by Masuda et al but not described.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to attach the showerhead of Masuda et al using a plurality of lateral screws as taught by Ohta.

4. Claims 3, 5, 29, 30, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al US Patent Application Publication 2002/0000197, and Ohta, US Patent 4,526,132, as applied to claims 1, 2, 21-28, and 31-34 above, and further in view of Lilleland et al, US Patent 6,073,577.

Masuda et al and Ohta differ from the present invention in that they do not teach a gas mixing plate and confinement ring.

Lilleland et al teaches an apparatus that includes: a showerhead 14 with a gas mix plate 22; and a confinement ring 17. (Figure 1, column 2 line 22 through column 3 line 14)

The motivation for adding a mixing plate and confinement ring of Lilleland et al to the apparatus of Masuda et al and Ohta is to more uniformly distribute the processing gas.

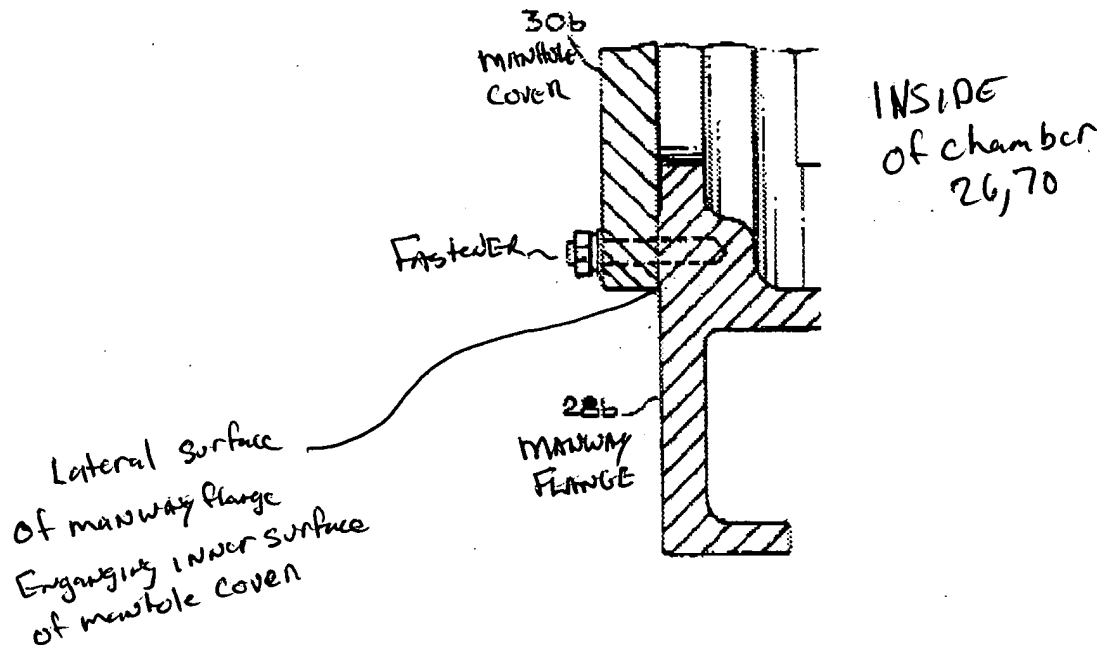
Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the gas mixing plate and confinement ring of Lilleland et al to the apparatus of Masuda et al and Ohta.

5. Claims 1, 2, 21-28, and 31-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al, US Patent Application Publication 2002/0000197, in view of Graves, US Patent 4,331,352, and Ohta, US Patent 4,526,132.

Masuda et al teaches a processing apparatus 1 that includes a process chamber 16 having a vertical chamber wall defining a chamber interior 14, a showerhead 12 having a lateral surface engaging the chamber wall provided in the process chamber. (Figures)

Masuda et al differs from the present invention in that Masuda et al does not teach the showerhead is held by a plurality of lateral fasteners with a fastener head and threaded shank, the fasteners structurally isolated from the chamber interior.

Graves teaches a manhole cover 30b which is part of the chamber wall, and a manway flange 28b which is interior to the manhole cover 30b. The manway flange 28b has a lateral surface that engages the inner surface of the manhole cover of the chamber wall, and a fastener physically separated from the chamber interior and prevents contamination of the chamber caused by thermal cycling of the fastener. As clearly seen in figure 5, and reproduced below.



(Figure 5)

Ohta teaches supporting a gas source 37 with a plurality of lateral screws 52, structurally isolated from the chamber. (Figure 3)

The motivation for attaching the showerhead of Masuda et al with the lateral screws of Graves is to provide a means of mounting the showerhead of Masuda et al (i.e. an interior part having a lateral surface engaging the chamber wall) as required by Masuda et al but not described.

The motivation for using a plurality of fasteners as taught by Ohta is to securely attach the showerhead of Masuda et al to the chamber wall.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to attach the showerhead of Masuda et al using a plurality of lateral fasteners as taught by Graves and Ohta.

Art Unit: 1792

6. Claims 3, 5, 29, 30, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al, Graves, and Ohta, as applied to claims 1, 2, 21-28, and 31-34 above, and further in view of Lilleland et al, US Patent 6,073,577.

Masuda et al, Graves, and Ohta differ from the present invention in that they do not teach a gas mixing plate and confinement ring.

Lilleland et al teaches an apparatus that includes: a showerhead 14 with a gas mix plate 22; and a confinement ring 17. (Figure 1, column 2 line 22 through column 3 line 14)

The motivation for adding a mixing plate and confinement ring of Lilleland et al to the apparatus of Masuda et al, Graves, and Ohta is to more uniformly distribute the processing gas.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the gas mixing plate and confinement ring of Lilleland et al to the apparatus of Masuda et al, Graves, and Ohta.

Response to Arguments

7. Applicant's arguments filed September 28, 2007 have been fully considered but they are not persuasive.

In regard to the argument that:

Masuda et al. nowhere suggests or discloses how the showerhead 12 is installed. Masuda et al. nowhere describes that the showerhead engages the chamber wall. One of ordinary skill in the art would not assume or conclude from the schematic shown in Masuda et al. that the showerhead engages the chamber wall.

The Examiner disagrees. It is true that Masuda et al does not disclose how the showerhead 12 is installed. Masuda et al clearly shows that the showerhead engages

Art Unit: 1792

the chamber wall in figures 1-5, 7-10 and 16. Furthermore, Masuda et al also teaches that the gas flows from the gas storage chamber 18 through the small holes of the shower plate 12 and sprayed into the reactor chamber. If the showerhead did not engage the wall gas would also flow from the gas storage chamber 18 around the edges of the showerhead and into the reactor chamber. Therefore, one of ordinary skill in the art, reading the drawings and teachings of Masuda et al, would conclude that the showerhead engages the chamber wall so that the gas is supplied only from the holes of the showerhead.

In regard to the argument that Masuda et al and Ohta fail to suggest or disclose "an apparatus to reduce particle contamination to a semiconductor device process chamber interior by thermal cycling of fasteners", the Examiner disagrees. This limitation is an intended use of the apparatus and is inherent in the connection taught by Ohta. Thus attaching the showerhead to the chamber wall of Masuda et al with screws not exposed to the interior of the chamber as taught by Ohta would result in reducing particle contamination to a semiconductor device process chamber interior by thermal cycling of fasteners.

In regard to the argument that Masuda et al and Ohta fail to suggest or disclose "a showerhead provided in said process chamber and having a lateral surface engaging said chamber wall", the Examiner disagrees. This argument was discussed in detail above. Furthermore, the drawings clearly show the lateral surface of the showerhead engaging the chamber wall, and Applicant has not provided any evidence or teaching in Masuda et al to support Applicant's argument that the lateral surface is not engaging the

Art Unit: 1792

chamber wall.

In regard to the argument that Masuda et al and Ohta fail to suggest or disclose "a plurality of exterior fasteners extending through said chamber wall and into said showerhead, with an exterior of said plurality of exterior fasteners physically separated from said chamber interior to prevent said particle contamination", the Examiner disagrees. As discussed above and in the rejection Ohta clearly teaches fasteners extending through a chamber wall to fasten two parts of a chamber together, and such fasteners would be physically separated from said chamber interior and prevent particle contamination.

The motivation for attaching the showerhead of Masuda et al with fasteners from the exterior of the chamber as taught by Ohta is to provide a means of attaching the showerhead as required by Masuda et al but not disclosed, and it is well known in the art to attach one object to another by passing a fastener through the first object and into the second object. Thus the suggestion or motivation is found in the references themselves and in the general knowledge of one of ordinary skill in the art. Furthermore, it has been held that applying a known technique to a known device ready for improvement to yield predictable results is obvious (see *KSR International Co. v. Teleflex Inc.*). In this case, it would have been obvious to use the screws of Ohta to attach the showerhead of Masuda et al.

One of ordinary skill in the art would have a reasonable expectation of success to be able to attach the showerhead of Masuda et al with screws.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The combination of Masuda et al and Ohta teach all of the limitations of the present invention.

In regard to the argument:

In addition, it is noted that modifying Masuda et al. with the confinement ring of Lilleland et al. would ensure that the showerhead of Masuda et al. does not engage the reactor walls, as the confinement ring of Lilleland et al. engages the chamber walls (see col 2, lines'49-54) rather than the showerhead electrode 10 of Lilleland et al., thus further ensuring that such modification does not produce Applicants invention.

The Examiner disagrees. Lilleland et al teaches in column 2 lines 49-54 that:

The purpose and function of confinement ring 17 is to cause a pressure differential in the reactor and increase the electrical resistance between the reaction chamber walls and the plasma thereby confining the plasma between the upper and lower electrodes.

Thus Lilleland et al does not teach that the confinement ring engages the walls, but that they increase the resistance between the plasma and the wall. Therefore, the argument is moot.

In regard to the arguments directed to Masuda et al and Graves, the Examiner disagrees for the following reasons:

- a. Graves is analogous art in that it is directed to the same problem, specifically, attaching an interior part of an apparatus to a chamber wall with a fastener. Thus, Graves is analogous art.
- b. The Applicant has misinterpreted the Examiners rejections. The arguments are based on parts of Graves not used in the rejection. Therefore the

Art Unit: 1792

arguments are moot. In order to clarify the rejection, the rejection has been rewritten to provide a more detailed description of the art as it has been applied in the rejection.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrie R. Lund whose telephone number is (571) 272-1437. The examiner can normally be reached on Monday-Thursday (10:00 am - 9:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone

Art Unit: 1792

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jeffrie R. Lund
Primary Examiner
Art Unit 1792

JRL
2/4/08